0306 - ___ 3

***** CONFIDENTIAL *****
***** PREDECISIONAL DOCUMENT *****

SUMMARY SCORESHEET FOR COMPUTING
PROJECTED PROPOSED REVISED HRS SCORE

SITE NAME: _Astroplate Inc._

CITY, COUNTY: _Phoenix, Maricopa County_

EPA ID #: _AZD981424468_   Lat/Long: _33°27'30"/112°07'36"_

PROGRAM ACCOUNT #: _FAZ0337PAA_   T/R/S: _T2N, R2E, Section 35_

EVALUATOR: _Janice T. Brickell_   DATE: _September 17, 1990_

THIS SCORESHEET IS FOR A: PA _X_   SSI ____   LSI ____

SIRe ____   PA Redo ____   Other (Specify) _____

RCRA STATUS (check all that apply):

___ Generator   ___ Small Quantity Generator   __ Transporter   ___ TSDF

___ Not Listed in RCRA Database as of (date of printout) __/__/__

STATE SUPERFUND STATUS:

___ BEP (date) __/__/__   ___ WQARF (date) __/__/__

	S pathway	S^2 pathway
Air Migration Pathway Score (S_a)	4.35	18.92
Groundwater Migration Pathway Score (S_{gw})	53.71	2884.76
Surface Water Migration Pathway Score (S_{sw})	0.852	0.734
On-site Exposure Pathway Score (S_{os})	*	
$S^2_a + S^2_{gw} + S^2_{sw} + S^2_{os}$	XXXXXXXX	2904.41
$(S^2_a + S^2_{gw} + S^2_{sw} + S^2_{os})/4$	XXXXXXXX	726.1
$\sqrt{(S^2_a + S^2_{gw} + S^2_{sw} + S^2_{os})/4}$	XXXXXXXX	26.9

*Pathways not evaluated (explain): _The on-site exposure pathway was not evaluated because there is no evidence of an observed release. All wastes are kept within the facility building. There is no public access to potential contaminant_

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AIR MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors

	Likelihood of Release	Maximum Value	Projected Score	Rationale	Data Qual.
1.	Observed Release	450	0	a	E
*2.	Potential to Release (Highest value assigned to any source evaluated)	390	10	iD	E
3.	Likelihood of Release (Higher of Lines 1 or 2)	450	90		

Waste Characteristics

4.	Toxicity/Mobility	100	100	ac	H
5.	Hazardous Waste Quantity	100	10	i	D
6.	Waste Characteristics (Lines 4+5)	200	110		

Targets

7.	Maximally Exposed Individual	50	50	e	E
*8.	Population	235	33	f	E
*9.	Land Use	10	10	g	EH
*10.	Sensitive Environments	100	0	k	H
11.	Targets (Lines 7+8+9+10, subject to a maximum of 235)	235	93		

Air Pathway Migration Score

12. Pathway Score (S_a)

   (Lines 3x6x11)/2.115×10^5 100 $\boxed{4.35}$ **

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*Use additional tables.
**S_a is not to be rounded to the nearest integer.

AIR PATHWAY CALCULATIONS

2. Potential to Release

Source Type	Source Type Factor Value (Table 2-6)	Source Mobility Factor Value (Table 2-10)	Sum	Source Contain. Value (Tables 2-4,2-5)	Emissi Sourc Value
	(A)	(B)	(A + B)	(C)	(A+B)
1. Tanks	40	50	90	1	90
2. Drums (TCA)	40	50	90	3	270
3.					
4.					

Drums of TCA are not considered for the air pathway becaus
they are not currently on site.

8. Population

Distance Category	Distance (miles)	(A) Population	(B) Distance Weight	(A x B)
1	on-site	25	5.265	131.68
2	>0 to 0.25	568	1.0	568
3	>0.25 to 0.5	947	0.1751	165.82
4	>0.25 to 1	5,922	0.0517	306.17
5	>1 to 2	53,093	0.0171	907.89
6	>2 to 3	75,000	0.0083	628.03
7	>3 to 4	105,930	0.0054	572.02

Air target populations = $\frac{\text{(Sum of A} \times \text{B)}}{100}$ = _____   Sum of (A x B) | 3379.56

AIR PATHWAY CALCULATIONS (Cont.)

9. Land Use

Land Use	Distance (miles)	(A) Distance Weight (Table 2-16)	(B) Value For Use Type	(A x B)
Commercial/Industrial/ Institutional	nsite	5.265	5	26.325
Single Family Residential	0.35	1.0	8	8
Multiple Family Residential	0.35	1.0	10	10
Parks	0.35	1.0	5	5
Prime Agricultural			7	
Nonprime Agricultural			5	

Sum of (A x B) | 49.325

Land use factor value = Sum of (A X B) Subject to maximum value of 10 = 10

10. Sensitive Environments

Type of Environment	(A) Assigned Value (Table 2-18)	Distance (miles)	(B) Distance Weight (Table 2-16)	$\dfrac{(A \times B)}{10}$

Sensitive environment factor value = $\dfrac{\text{Sum of } (A \times B)}{10}$ = _____

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GROUNDWATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors

Likelihood of Release	Maximum Value	Projected Score	Rationale	Data Qual.
1. Observed Release	500	500		E
*2. Potential to Release				
2a. Containment	10	10		E
2b. Net Precipitation	10	1	k	H
2c. Depth to Aquifer/ Hydraulic Conductivity	35	35	1	E
2d. Sorptive Capacity	5	5		
2e. Potential to Release (Lines 2ax(2b+2c+2d))	500			
3. Likelihood of Release (Higher of Lines 1 or 2e)	500	500		

Waste Characteristics

	Maximum Value	Projected Score	Rationale	Data Qual.
4. Toxicity/Mobility	100			E
5. Hazardous Waste Quantity	100	21		E
6. Waste Characteristics (Lines 4+5)	200	121		

Targets

	Maximum Value	Projected Score	Rationale	Data Qual.
7. Maximally Exposed Individual	50			
*8. Population				
8a. Level I Concentrations	200			
8b. Level II Concentrations	200			
8c. Level III Concentrations	200			
*8d. Potential Contamination	200			E
8e. Population (Lines 8a+ 8b+8c+8d, subject to a maximum of 200)	200			
9. Groundwater Use				
9a. Drinking Water Use	50	30		E
9b. Other Water Use	20			E
9c. Groundwater Use (Lines 9a+9b, with a maximum of 50)	50	50		
10. Wellhead Protection Area	50			
11. Targets (Lines 7+8e+9c+10, subject to a maximum of 200)	200			

     Aquifer Evaluated _____

GROUNDWATER MIGRATION PATHWAY SCORESHEET (CONCLUDED)

Factor Categories and Factors

Likelihood of Release	Maximum Value	Projected Score	Rationale	Data Qual.
12. Aquifer Score [Lines 3x6x11)/2x10^5]**	100	$\sim$ $\pm 1/65.5$		
		$\cdots$ $\cdots /5.0$		

Groundwater Migration Pathway Score

| 13. Pathway Score (Sgw), (Highest Value from Line 12 for all aquifers evaluated) | 100 | $\boxed{\;\pm 1/\;}$ ** 65.5 | | |

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* Use additional tables
** These scores are not to be rounded to the nearest integer.

2. Potential to Release

Layer Description (i.e., description of layers between contamination and aquifer)	(T) Thickness (ft)	(HC) Hydraulic Conductivity (cm/sec) (see Table 3-5)	(SC) Average Sorbent Content Value From Table 3-6	(T/HC)	(TxSC)
Upper Aluval Unit	100	10^{-2}	3	___	300
				Sum(T/HC)=	Sum(TxSC 300

Sum(T) _____

Thickness-Weighted Hydraulic/Conductivity = $\dfrac{Sum(T)}{Sum(T/HC)}$ = _____

Depth to Aquifer/Hydraulic Conductivity (Table 3-4) = _____

Sorbent Content = $\dfrac{Sum(T \times SC)}{100}$ = $\dfrac{300}{100} = 3$

Sorptive Capacity Factor (Table 3-7) = 5

8. Population

Actual Contamination

Well Identifier	Contaminant Detected	Concentration (Note Units)	Benchmark	(A) Population	(B) Level* Divisor	(A/B)

* Divisors
  - Level I   =   1
  - Level II = 10
  - Level III = 100

Sum (A/B) Level I _____

Sum (A/B) Level II _____

Sum (A/B) Level III _____

Aquifer Evaluated _____

8. Population

Potential Contamination

Dilution Weighting Factor (DW)

Distance (miles)	Karst	All Others	(P) Population	(DW x P)
0 to 1/4	1.00	1.00		
>1/4 to 1/2	0.62	0.62		
>1/2 to 1	0.50	0.32	990,000	316,800
>1 to 2	0.50	0.18		
>2 to 3	0.50	0.13		
>3 to 4	0.50	0.08		
			Sum (DW x P)	316,800

Potential contamination = $\dfrac{\text{Sum(DW x P)}}{100}$ = 3,168

Aquifer Evaluated _____

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Maximum Value	Projected Score	Rationale	Data Qual.
DRINKING WATER THREAT				
Likelihood of Release				
1. Observed Release	120		±	E
2. Potential to Release by Overland Flow				
2a. Containment	10	5	λ	E
2b. Runoff	6	1	μ	E
2c. Distance to Surface Water	6	1	∨	E
2d. Potential to Release by Overland Flow (Lines 2ax(2b+2c))	120			
3. Potential to Release by Flood				
3a. Containment (Flood)	10	10	ω	E
3b. Flood Frequency	12		ω	E
3c. Potential to Release by flood (Lines 3ax3b)	120	10		
4. Potential to Release (Lines 2d+3c, subject to a maximum of 120)	120	≤		
5. Likelihood of Release (Higher of Lines 1 or 4)	120	≤		
Waste Characteristics				
6. Toxicity/Persistence	100	32	∨	E
7. Hazardous Waste Quantity	100			
8. Waste Characteristics (Lines 6+7)	200			
Targets				
9. Maximally Exposed Individual	50			≤
*10. Population				
10a. Level I Concentrations	200			
10b. Level II Concentrations	200			
10c. Level III Concentrations	200			
10d. Potential Contamination	200		∨	
10e. Population (Lines 10a + 10b+10c+10d, subject to a maximum of 200)	200			

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Factor Categories and Factors	Maximum Value	Projected Score	Rationale	Data Qual.

DRINKING WATER THREAT (CONCLUDED)

Targets (Concluded)

11. Surface Water				
11a. Drinking Water Use	50	$\leq$	$\vee$	E
11b. Other Water Use	20		$\equiv$	H
11c. Surface Water Use				
(Lines 11a+11b)	50	95		
12. Targets (Lines 9+10e+11c,				
subject to a maximum of 200)	200			

Drinking Water Threat Score

13. Drinking Water Threat (Lines 5x8x12)	4.8×10^6			

HUMAN FOOD CHAIN THREAT

Likelihood of Release

14. Likelihood of Release (Same Value as Line 5)	120			

Waste Characteristics

15. Toxicity/Persistence	100			
16. Hazardous Waste Quantity	100			
17. Waste Characteristics (Lines 15+16)	200			

Targets

*18. Population				
18a. Potential Human Food Chain Contamination	200			
18b. Actual Human Food Chain Contamination	200			
18c. Population (Lines 18a+18b, subject to a maximum of 200)	200			
19. Fishery Use	50			
20. Targets (Lines 18c+19, subject to a maximum of 200)	200			

Factor Categories and Factors	Maximum Value	Projected Score	Rationale	Data Qual.
HUMAN FOOD CHAIN THREAT (Concluded)				
Human Food Chain Threat Score				
21. Human Food Chain Threat (Lines 14x17x20)	4.8×10^6	$\mathcal{O}$	aa	_____
HUMAN RECREATION THREAT				
***NOT EVALUATED QUANTITATIVELY				

SURFACE WATER MIGRATION PATHWAY SCORESHEET (CONTINUED)

Factor Categories and Factors	Maximum Value	Projected Score	Rationale	Data Qual.
ENVIRONMENTAL THREAT				
29. Likelihood of Release (Same Value as Line 5)	120	_____	_____	_____
Waste Characteristics				
30. Ecosystem Toxicity/Persistence	100	_____	_____	_____
31. Hazardous Waste Quantity	100	_____	_____	_____
32. Waste Characteristics (Lines 30+31)	200	_____	_____	_____
Targets				
*33. Sensitive Environments				
33a. Level I Concentrations	120	_____	_____	_____
33b. Level II Concentrations	120	_____	_____	_____
33c. Potential Contamination	120	_____	_____	_____
33d. Sensitive Environments subject to a maximum of 120)	120	_____	_____	_____
34. Targets (Value from Line 33)	120	_____	_____	_____
Environmental Threat Score				
35. Environmental Threat (Lines 29x32x34)	2.88×10^6	0	ii	_____

SURFACE WATER MIGRATION PATHWAY SCORE FOR A WATERSHED

36. Watershed Score [(Lines 13+21+35)/48,000 subject to a maximum of 100]	100	0.757 **	

SURFACE WATER MIGRATION PATHWAY SCORE

37. Pathway Score (Sgw), (Sum of scores from Line 36 for all watersheds evaluated, subject to a maximum of 100)	100	0 ?? **	

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* Use additional tables.
** These scores are not to be rounded to the nearest integer.

ON–SITE EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors

Resident Population Threat	Maximum Value	Projected Score	Rationale	Data Qual.
1. Likelihood of Exposure	100			
2. Waste Characteristics	5			
3. Targets				
3a. High–Risk Population	100			
3b. Total Resident Population	100			
3c. Terrestrial Sensitive Environments	25			
3d. Targets (Lines 3a+3b+3c, subject to a maximum of 100)	100			
4. Resident Population Threat Score (Lines 1x2x3d)	50,000			

Nearby Population Threat

	Maximum Value	Projected Score	Rationale	Data Qual.
5. Likelihood of Exposure				
5a. Waste Quantity	100			
5b. Accessibility Frequency of Use	100			
5c. Likelihood of Exposure	100			
6. Waste Characteristics	5			
*7. Targets				
7a. Population Within 1–Mile	100			
7b. Targets (Line 7a, subject to a maximum of 100)	100			
8. Nearby Population Threat Score (Lines 5cx6x7b)	50,000			

On–site Exposure Pathway Score

	Maximum Value	Projected Score	Rationale	Data Qual.
9. On–site Exposure Pathway Score (Sos) (Lines [4+8]/500, to a maximum of 100)	100	( ) **		

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* Use additional table.

**These scores are not to be rounded to the nearest integer.

AIR PATHWAY

a. There is no documented evidence to determine a release to air. Raw
    materials on-site are kept within the building where the floor is
    made of concrete and slopes to a central containment drain. The
    facility has no record of spills or releases. There is a potential
    for substances to release to air. All tanks are above-ground and
    open. The building is well ventilated with large doors left open
    during processing. (1)

Waste Sources

Wastestream: 15,000 gallons of wastewater per day enter the sewer system
(1).

Tanks: Double tanks with polypropylene liners
               Within a building and protected from the weather
               Concrete floor slopes to a central containment drain (1)

Sump: Below-ground with dikes so that it cannot overflow
               Concrete lined

Vapor
Degreaser: TCA was used until 1985 when the facility converted to
               using organic soaps
               1/2 of 55-gallon drum of spent solvent generated per month

b. Particulate mobility = 3

    TCA is not factored into the air pathway or the on-site pathway
    scores because it is no longer used at the facility.

    The following substances were used at the facility (1):

nitric acid	gas mob = 0	tox = 0	aq mob = 3	per = 0
sulfuric acid	gas mob = 0	tox = 0	aq mob = 3	per = 0
hydrochloric acid	gas mob = 0	tox = 0	aq mob = 3	per = 0
zinc phosphate	gas mob = 0	tox = 2	aq mob = 3	per = 0
methyl ethyl ketone	gas mob = 3	tox = 0	aq mob = 3	per = 2
TCA	gas mob = 3	tox = 2	aq mob = 3	per = 1
chromium(VI)	gas mob = 0	tox = 5	aq mob = 1	per = ?
cyanide	gas mob = 0	tox = 3	aq mob = 0	per = 2
cadmium		tox = 5	aq mob = 3	

c. For toxicity/mobility, use chromium(VI) tox = 5 and particulate mob
    = 3 for a value of 100.

d. Substances with the potential to release to air would be those found in the above-ground tanks and the below-ground sump.

It is unknown to FIT if the facility is still using a zinc cyanide solution or if this solution has been replace by the zinc phosphate solution.

Source volume is used to determine hazard waste quantity.

sulfuric acid solution	2300 gallons
nitric acid solution	750 gallons
hydrochloric acid solution	20 gallons
chem film tank (contains chromium solution)	600 gallons
zinc phosphate tank	120 gallons
rinse tanks	7500 gallons
sump	2000 gallons

Total = 13,290 gallons*1 yd^3/200 gallons = 66.45 yd^3

HWQ = 66.45 yd^3/25 = 2.658, use default = 10

e. There are 25 workers on-site (1).

f. See table. Census tract shows an estimated 4,817 people/$mile^2$.

g. See table. Land use is combined with commercial, industrial, and residential areas within 0.25 miles of the site.

h. There are no sensitive environments within a 4-mile radius of the site (14).

GROUNDWATER

i. The W. Central Phoenix study shows that the aquifers underneath the site are contaminated with trichloroethylene (TCE), 1,1-dichloroethylene (1,1-DCE), and perchloroethane (PCE) (2).

Between 1984 and 1985 Astroplate used trichloroethane (TCA) in its vapor degreaser (1). TCA is used as an industrial cleaner and has been shown to degrade to 1,1-DCE under laboratory conditions (3).

Although the aquifer underneath Astroplate is proven to have contaminant plumes, Astroplate has not been identified as a direct contributor to the contamination. However, the plating company which occupied the facility prior to Astroplate could have significantly contributed to the groundwater contamination.

j. Concrete floors are not 100% impervious. The sumps are below-ground and constructed of concrete. There is no lining or a system for monitoring leaks.

k. For the south Phoenix Area, net precipitation = 0.5026 inches (4,5).

l. Hydraulic conductivity = 10^{-2} cm/sec (6).

Depth to top of aquifer = 100 ft. (2 p.3-6).

The Upper Alluvial Unit is an unconfined aquifer (2 p.3-3).

m.   Soil types: unconsolidated sands, gravels, clays
thickness ranges from 400-600 ft. (2 p.3-1)

n.   For toxicity/mobility, a value of 100 is used due to the level of heavy metals commonly found in plating operations and the absence of information on processes done by the previous owner/operator.

O.   Hazardous Waste Quantity for tanks and sump = 2.658 (d).

Wastestream of 15,000 gallons of wastewater per day enters into the sewer system after neutralization.
HWQ = 15,000 gallons*2000lbs/200 gallons = 150,000lbs/50,00 = 3

Two drums of used zinc plating solution = 110 gallons/5,000
HWQ = 0.022

1/2 a drum of spent solvent (TCA) = 25 gallons * 2,000 lbs/200 gal = 250
WHSQ/10 = 250/10 = 25

Total HWQ = 2.658 + 3 + 25 = 31

p.   The Shamrock Dairy Well is 0.25 to 0.50 miles away from the site.

q.   See table. City of Phenix Well #68 is one mile away from the site. This is the nearest active well. Drinking water in the Phoenix area is from a blended system and serves a population of 990,000 people; this excludes populations from Scottsdale and Mesa, which also receive Phoenix water (7,8).

r.   Groundwater is blended with imported surface water. The City of Phoenix gets 92% of its drinking water from surface water sources. The remaining 8% is from groundwater wells within Phoenix (8).

s.   Groundwater from Salt River Project (SRP) wells is used for irrigation.

SURFACE WATER

t.   There is no documented evidence of a release to surface water. The liklihood of a release is low due to the type of containment at the facility (a). Hydrolic conductivity is moderately high, therefore, potential spills are more likely to enter groundwater than migrate to surface water (1).

u.   The facility is located on less than 1-acre of land in a mixed commercial, industrial, and residential area (1).

The 2-year, 24-hour rainfall = 1.4 inches (12).

Soils have a low runoff potential due to its high hydraulic conductivity (1).

v. Distances to surface water:
Roosevelt Canal   3.5 miles away
Grand Canal   1.5 miles away
Salt River   4.0 miles away

w. There is no evidence that containment has been certified by a professional engineer. The site floods less often than a 100-year floodplain (13). FIT estimates that the site is in a 500-year floodplain.

x. For toxicity/persistence, use TCA tox = 2, per = 1 for a value of 37.

y. Surface water in the area is not used as a drinking source. There are no drinking water intakes along the canals. Intakes are on the Salt and Verde river, 30 miles east of Phoenix (9).

z. Surface water from Salt River, Grand Canal, and Roosevelt Canal, are used for irrigation ()

aa. Human food chain and sensitive environments were not evaluated for the surface water pathway because there are no fisheries or sensitive environments with the 15-mile target distance limit.

References

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6. Brown, J., Personal communication between J. Brown, U.S. Geological Survey, Tucson, AZ and T. Halloran, Earth Technology, regarding the hydrogeology of the West Salt River Valley, April 1988.

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